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FORM PTO-1390 (Rev. 9-2001)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER Casati 2-3-37	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371					
U.S. APPLICATION NO. (If known, see 37 CFR 1.5)		10/030387			
INTERNATIONAL APPLICATION NO. PCT/GB00/01481		INTERNATIONAL FILING DATE April 18, 2000		PRIORITY DATE CLAIMED July 21, 1999	
TITLE OF INVENTION Telecommunications System					
APPLICANT(S) FOR DO/EO/US Casati, A., Palat, S., Yamini, H., Yang, J.					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input checked="" type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input type="checkbox"/> is attached hereto.</p> <p>b. <input checked="" type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input checked="" type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input type="checkbox"/> have not been made and will not be made</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11 to 20 below concern document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input type="checkbox"/> Other items or information:</p>					
<p>"Express Mail" mailing label number <u>EE 1321598776 US</u> Date of Deposit <u>1/3/02</u> I hereby certify that this <u>App.</u> is being deposited in the U.S. Patent and Trademark Office "Express Mail Post" box under 37 CFR 1.510 on the date</p> <p>Addressed to the Commissioner of Patents and Trademarks Washington, DC 20591</p> <p><u>E. Noertz</u> Signature of person mailing paper of fee) <u>E. Noertz</u> Signature of person mailing paper of fee)</p>					

U.S. APPLICATION NO. 10/030387 INTERNATIONAL APPLICATION NO. PCT/GB00/01481		ATTORNEY'S DOCKET NUMBER Casati 2-3-3-	
21. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =		CALCULATIONS PTO USE ONLY	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		\$ 890.00 \$ 130.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	14 - 20 =		x \$18.00
Independent claims	2 - 3 =		x \$84.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280.00
TOTAL OF ABOVE CALCULATIONS =		\$ 1020.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.		SUBTOTAL = \$ 1020.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).		\$	
TOTAL NATIONAL FEE =		\$ 1020.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +		\$	
TOTAL FEES ENCLOSED =		\$	
		Amount to be refunded:	\$
		charged:	\$
a. <input type="checkbox"/> A check in the amount of \$ _____ to cover the above fees is enclosed. b. <input checked="" type="checkbox"/> Please charge my Deposit Account No. <u>12-2325</u> in the amount of \$ <u>1020.00</u> to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>12-2325</u> . A duplicate copy of this sheet is enclosed. d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038			
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status. SEND ALL CORRESPONDENCE TO: <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="width: 45%;"> Docket Administrator Lucent Technologies Inc. Room 3J-219 101 Crawfords Corner Rd. Holmdel, NJ 07733-3030 </div> <div style="width: 45%; text-align: right;">  SIGNATURE Gregory J. Murgia NAME 41209 REGISTRATION NUMBER </div> </div>			

IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Patent Application

Inventor(s)	Alessio Casati Sudeep Kumar Palat Hatef Yamini Jin Yang	
Case	2-3-3-3	
Serial No.		Group Art
File Date		
Examiner		
Title	Telecommunications System	

ASSISTANT COMMISSIONER FOR PATENTS AND TRADEMARK
WASHINGTON, DC 20231

Dear Sir:

PRELIMINARY AMENDMENT

The version of the claims showing the changes made to the claims of the application are attached for your review.

In The Claims:

Please replace claims 4, 5, 7, 8 and 14 as follows and cancel claims 15 and 16 (which seems to have been incorrectly numbered as 15)

4. (amended) A telecommunications system as claimed in claim 1 including a stored mapping table, mapping the MSISDN number of the mobile station to its IMSI number, the table being stored where it can be accessed by the home VoIP call control server, for passing to the serving VoIP call control server.

5. (amended) A telecommunications system as claimed in claim 1 including means for providing an enhanced terminal registration message so that, upon registration, a mobile station informs the serving VoIP call control server of its IMSI number.


7. (amended) A telecommunication system as claimed in claim 1, wherein the VoIP call control server is a H323 gatekeeper or a SIP (Session Initiation Protocol) proxy/server.
8. (amended) A telecommunication system as claimed in claim 1 which is a UMTS system.
14. (amended) A method as claimed in claim 10, used in a UMTS system.

REMARKS

By way of the Preliminary Amendment, Applicant has amended the claims in the above-identified application in accordance with typical U.S. patent practice. In the event of any fees inadvertently omitted or any improper payment of fees, the Commissioner is hereby authorized to charge or credit Lucent Technologies Deposit Account No.12-2325 to correct the error now or during the pendency of this application, except for the issue fee.

If the Examiner has any questions or feels that a telephone conversation would be helpful, please contact Julio Garceran at (973) 386-2286.

Respectfully submitted,
Alessio Casati
Sudeep Kumar Palat
Hatef Yamini
Jin Yang

By: 
Julio A. Garceran, Attorney
Reg. No. 37,138

Lucent Technologies Inc.

Date: 11/26/01

VERSION OF CLAIMS SHOWING CHANGES

4. (amended) A telecommunications system as claimed in [any preceding] claim 1 including a stored mapping table, mapping the MSISDN number of the mobile station to its IMSI number, the table being stored where it can be accessed by the home VoIP call control server, for passing to the serving VoIP call control server.
5. (amended) A telecommunications system as claimed in [any of Claims] claim 1 [to 3] including means for providing an enhanced terminal registration message so that, upon registration, a mobile station informs the serving VoIP call control server of its IMSI number.
7. (amended) A telecommunication system as claimed in [any preceding] claim 1, wherein the VoIP call control server is a H323 gatekeeper or a SIP (Session Initiation Protocol) proxy/server.
8. (amended) A telecommunication system as claimed in [any preceding] claim 1 which is a UMTS system.
14. (amended) A method as claimed in [any one of Claims] claim 10 [to 13], used in a UMTS system.

TELECOMMUNICATIONS SYSTEM

Background of the Invention

5 This invention relates to a telecommunication system and in particular it relates to UMTS (Universal Mobile Telecommunications System).

Under UMTS proposals, a mobile station (MS) can be connected via radio interface both as an IP (Internet Protocol) terminal and as a traditional phone terminal.
10 With an IP connection and the associated Quality of Service, QoS, mechanism, a terminal can make and receive a voice call via the packet-switch domain.

In order for an MS to receive a VoIP (Voice over Internet Protocol) call, it has to have an IP address assigned so that it can receive call setup messages and media streams over IP. However, under current UMTS specifications, a UMTS core network (CN) can
15 initiate a PDP (Packet Data Protocol) context set up only for static IP addresses. This is because only the home gateway GPRS Support Node (GGSN) associated with the static IP address holds the IP to IMSI (International Mobile Subscriber Identity) address mapping required to contact the home location register (HLR), where GPRS denotes
20 General Packet Radio System. When dynamic IP addressing is used and when an MS is not in an active PDP context, the network cannot initiate a PDP context set up and therefore the MS cannot receive calls.

Description of the Prior Art

25 Presently, there are two known solutions which enable a MS to receive VoIP (Voice over Internet Protocol) calls. These are 1) to use static IP address allocation or 2) to use dynamic IP address assignment but requiring an active PDP context to be always maintained.

For the second known solution, an active PDP context needs to be maintained even when a mobile station is not in communication. This represents a waste of IP address space and other network resources such as the resource for PDP management.

The present invention arose in an attempt to provide an improved solution for a mobile station to receive the VoIP (Voice over Internet Protocol) calls.

Brief Summary of the Invention

A mapping table may be stored. Alternatively an enhanced terminal registration message may be provided so that, upon registration of a mobile station at a visiting network, the mobile station informs the serving VoIP call control server of its IMSI number.

- 5 In a further aspect there is provided a method of enabling a mobile station of a Universal Mobile Telecommunications System UMTS telecommunications system to receive VoIP calls established when dynamic IP addressing is used and the mobile station is not in an active PDP context whilst roaming away from a home network, the mobile station or its user having an associated MSISDN number, the
- 10 method comprising informing a serving GGSN of the roaming network, of the IMSI number of the mobile station, and enabling a serving VoIP control server to map the MSISDN number of the mobile to the IMSI number.

Brief Description of the Drawings

- Embodiments of the invention will now be described, by way of example only,**
- 15 **with reference to the accompanying drawings in which;**

Figure 1 shows a UMTS mobile station connected via a radio interface to make and receive voice calls by either a circuit switch or packet-switch domain; and

Figure 2 shows a call setup procedure protocol to a roaming mobile station.

Detailed Description of Preferred Embodiments of the Invention

- 20 **A UMTS mobile station (MS) can be connected via a radio interface both as an IP terminal and as a traditional mobile voice terminal. With an IP connection and the associated QoS (Quality of Service) mechanism, a terminal can make and receive a voice call via either the circuit-switch domain or the packet-switch domain. This is illustrated in Figure 1. A mobile station 1 is linked by a radio link to the UMTS Terrestrial Radio**
- 25 **Access Network, UTRAN 2. A call may then be routed over a circuit-switch path, shown generally as 3, or a packet-switch path shown generally as 4. If the call is to be via the circuit-switch path, then it is passed through a switching circuit 5 which includes a**

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visiting location register VLR 6. It is then routed through the PSTN/ISDN network 8 to a receiving telephone terminal 9.

If a call is to be made over the packet-switch path 4, then it is routed via a Serving
5 GPRS Support Node (SGSN) 10 and a gateway GPRS support node (GGSN) 11 to a multi-service packet network 12 and thence onwards to a receiver such as a computer 13.

The same paths are of course used when the mobile station is receiving a call.

10 Note that in the Figure the term 3G refers to "third generation".

To enable a voice call across packet network and circuit networks, a voice over Internet protocol Interworking Function VoIP IWF 14 is required. This has two major components, a gatekeeper/signalling gateway 15 and a media gateway 16. The
15 gatekeeper 15 provides call control functionality and supplemental features such as call forwarding, call waiting and multiple-way call. The gatekeeper also provides functions such as address translation, admission control such that permission to complete call and set bandwidth limitations, manages gateways and controls call signalling, call
management, reporting and logging. The signalling gateway part provides signalling into
20 working at an interface to the SS7 (Signalling System No. 7) network.

The media gateway 16 provides many services such as protocol and media translations. It performs bi-directional synchronous/asynchronous conversion (Time Division Multiplex (TDM) to packet) and signalling inter-working functions including
25 control interface and connection management.

HLR 17 is a Home Location Register.

In order for a mobile station to receive a VoIP call, it has to have an IP address assigned so that it can receive call setup messages and media streams over IP.

According to a current UMTS specification, UMTS CN can initiate a PDP context setup only for static IP addresses. This is because only the GGSN associated with the static IP address holds the IP to IMSI address mapping required to contact the HLR. However, when dynamic IP addressing is used and when an MS is not in an active PDP context, the network cannot initiate PDP context setup and hence the MS cannot receive calls.

As described above, present methods of overcoming this problem are unsatisfactory.

The present invention is based on two assumptions. Firstly, the mobile user agrees to receive the VoIP calls when there is no PDP context yet established and secondly a mechanism must be provided in which, for any MS in its domain, the home gatekeeper is aware of the gatekeeper and its associated IP address that is currently serving the MS if it is roaming.

The present invention provides a solution to the problems of the prior art which supports dynamic IP address assignment and enables mobile terminated calls without pre-established PDP context. Essentially, the invention includes a mechanism for informing the serving GGSN of the IMSI number of the called MS, and a mechanism for the local (i. e. serving) gatekeeper (GK) to map the called Mobile Subscriber Integrated Services Digital Network MSISDN number to an IMSI number.

In order to achieve this in embodiments of the invention, an interface is required, between the serving GGSN and the serving gatekeeper (or other VoIP call control server) in order for the GGSN to receive a request from the gatekeeper to initiate a PDP context setup procedure using the IMSI number of the mobile station. In such a

request, the Quality of Service QoS requirement can be indicated for the PDP context. QoS parameters can be passed to the PDU notification message the GGSN sends to the serving GPRS support mode SGSN to get the mobile station to initiate a PDP context activation request. After PDP context is set up, the GGSN replies with the IP address
5 of the mobile station. The entities which are involved, i.e. the GGSN and the gatekeeper or other entity, are within the same administrative domain (i.e. network). The association between the gatekeeper and the GGSN can be pre-configured.

10 In order to trigger a PDP context setup using the IMSI number, a mechanism is required for the local gatekeeper to map the MSISDN number to the IMSI number.

The IMSI number is a number which is associated with the mobile station (or more commonly with the subscriber identification module) SIM (card) which the user places within the mobile station, and which uniquely identifies that station or SIM. The
15 number is generally not made public.

Two alternatives for triggering the PDP context set-up are proposed.

20 Firstly, the home gatekeeper of the called mobile station may be enhanced in order to map the mobile station's MSISDN number to its IMSI number. This mapping will be static and so the mapping table can be stored in a directory server for example and use an interface within the gatekeeper and the directory server to perform the mapping. Alternatively, an interface between the gatekeeper and the home location register (HLR) can be provided. In that case, the home gatekeeper then needs to pass the IMSI number
25 of the called mobile station to the serving gatekeeper in the standard call setup message. For example, when so-called H.323 messaging is used, the IMSI number is inserted as an alias address for the called party in a setup message. If SIP (Session Initiation Protocol) is used, then the IMSI number can be put as an alias in other messages. For H.323

Claims

1. A Universal Mobile Telecommunications System UMTS telecommunication system including a mobile station, having a Mobile Subscriber Integrated Services Digital Network MSISDN number associated with the station or its user, and means for enabling the mobile station to receive Voice-Over Internet Protocol VoIP calls established when dynamic Internet Protocol IP addressing is used and the mobile station is not in an active Packet Data Protocol PDP context whilst roaming away from a home network, comprising: means for informing a serving Gateway GPRS Serving Node GGSN of the roaming network of the International Mobile subscriber Identity IMSI of the called mobile station, and means for enabling a serving VoIP call control server to map a called MSISDN number to the IMSI number.
5
2. A telecommunication system as claimed in Claim 1, including an interface between the serving GGSN and the serving VoIP call control server, enabling the GGSN to receive a request from the VoIP server to initiate PDP context set up procedures using the IMSI number of the mobile station.
10
3. A telecommunications system as claimed in Claim 2, wherein the Quality of Service Requirement QoS is indicated for the PDP context.
4. A telecommunications system as claimed in any preceding claim including a stored mapping table, mapping the MSISDN number of the mobile station to its IMSI number, the table being stored where it can be accessed by the home VoIP call control server, for passing the IMSI number to the serving VoIP call control server.
20
5. A telecommunications system as claimed in any of Claims 1 to 3 including means for providing an enhanced terminal registration message so that, upon registration, a mobile station is arranged to inform the serving VoIP call control server of its IMSI number.
25
6. A telecommunication system as claimed in Claim 5, wherein the IMSI and MSISDN numbers are both put as aliases of the mobile station in one or more call setup messages between home and serving VoIP call control server.

8. A method of enabling a mobile station of a Universal Mobile

9. A method as claimed in Claim 8, including providing a stored mapping table, accessible by the home VoIP call control server, which maps the MSISDN number to its IMSI number.

11. A method as claimed in Claim 8, wherein when the mobile station registers with the roaming network, it informs the serving VoIP call control server with its IMSI number.

25 **13. A Universal Mobile Telecommunications System UMTS**
telecommunications system substantially as hereinbefore described with reference to,
and as illustrated by, the accompanying drawings.

30

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



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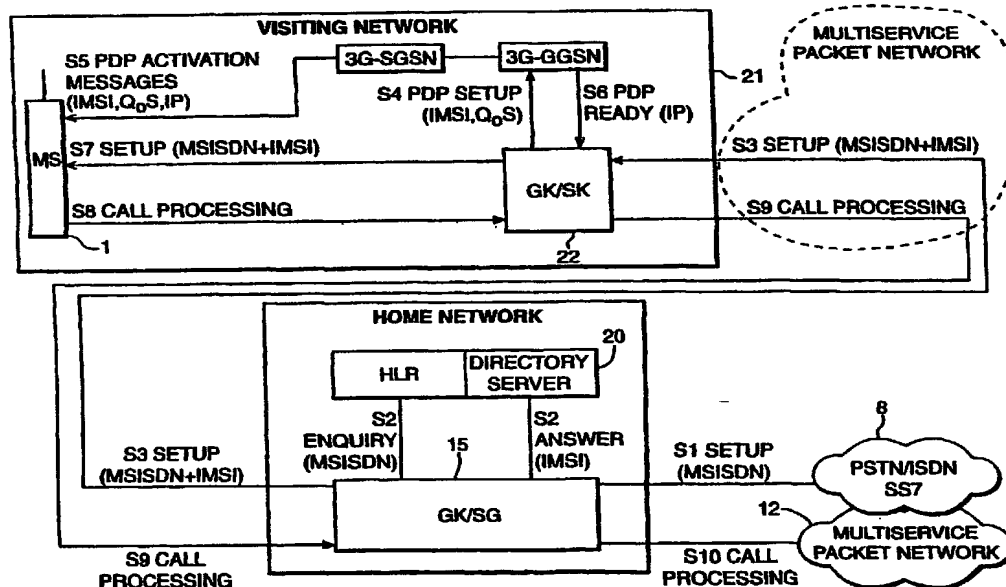
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(54) Title: TELECOMMUNICATIONS SYSTEM

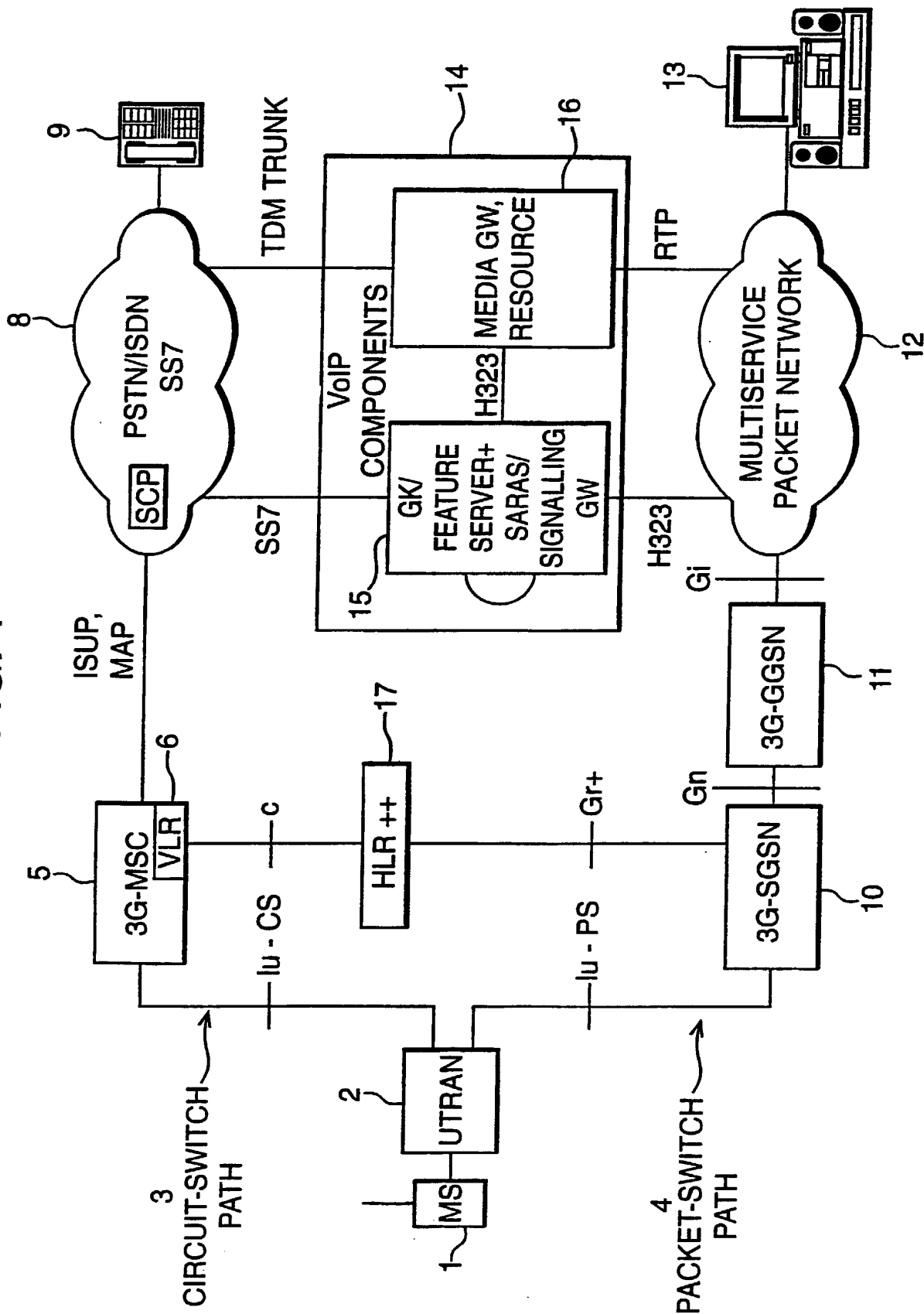


(57) Abstract: A telecommunication system including a mobile station, and means for a mobile station to receive voice-over Internet Protocol (VoIP) calls when it is roaming away from a home network, comprising: means for informing a serving GGSN of the International Mobile subscriber Identity (IMSI) of the called mobile station, and means for enabling a local VoIP control server to map a called MSISDN number to the IMSI number.

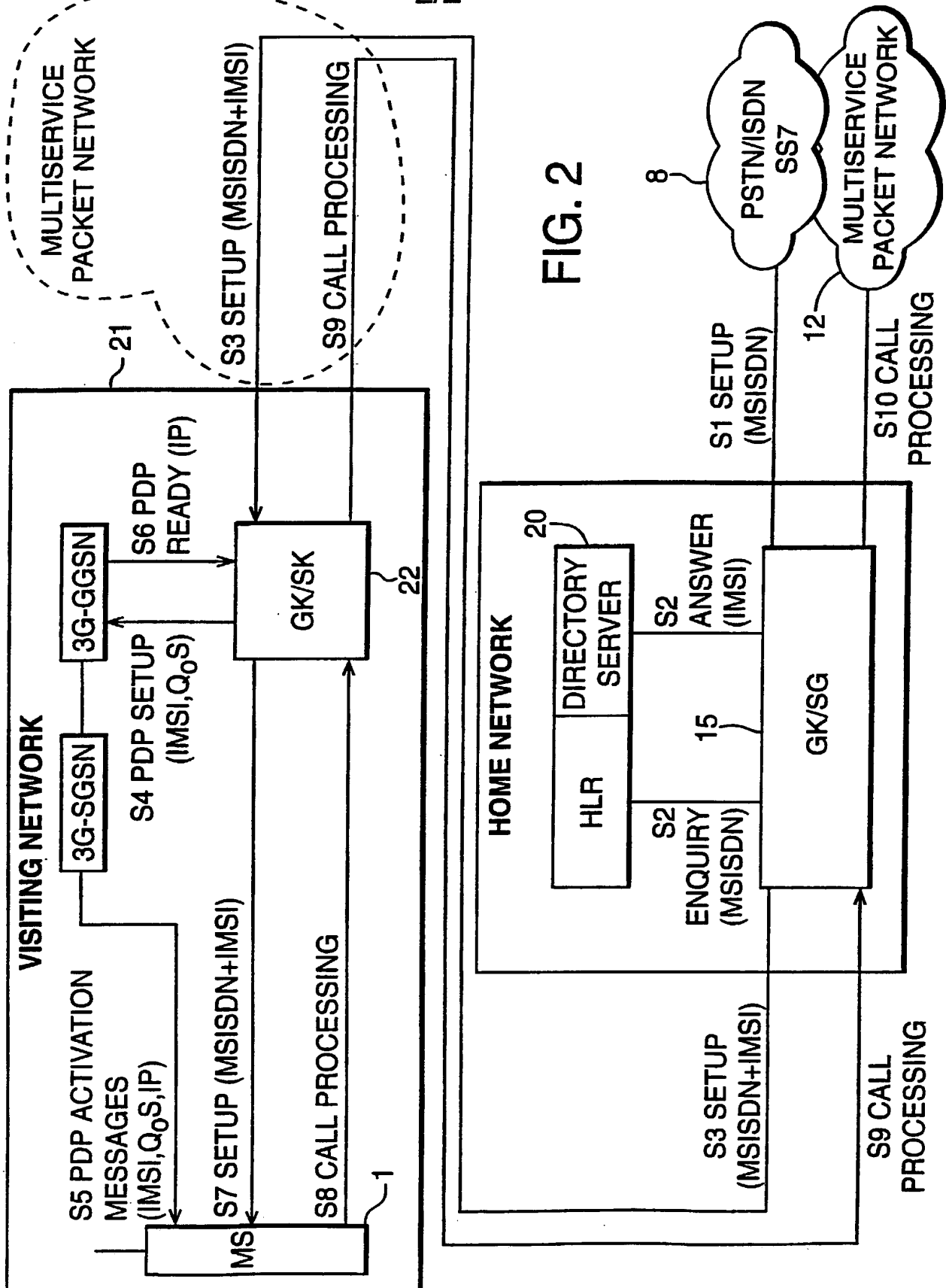
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1/2

FIG. 1



2/2



A. Casati 2-3-3-3

IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Declaration and Power of Attorney

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **Telecommunications System** the specification of which

[] is attached hereto

OR

[✓] was filed on 1/3/03 and granted Application Serial Number 10/030,387.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by an amendment, if any, specifically referred to in this oath or declaration.

I acknowledge the duty to disclose all information known to me which is material to patentability as defined in Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

European Application No. 99305778.5 filed July 21, 1999

I hereby claim the benefit under Title 35, United States Code, 120 of any foreign application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

International
Application No.
PCT/GB00/01481

Filed
18th April 2000

Status
Pending

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States

Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorney(s) with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith:

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I hereby authorize these attorneys to insert in the above blanks the filing date and application serial no. when known.

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1-00 Full name of 1st joint inventor: Alessio Casati

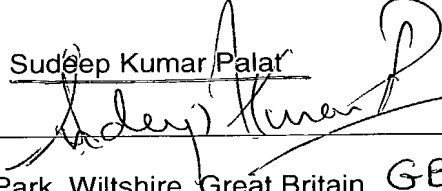
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